SOLIDAGO (ASTERACEAE) OF LIMITED DISTRIBUTION IN THE CENTRAL UNITED STATES

CONSTANCE E. S. TAYLOR and R. JOHN TAYLOR

Department of Biology
Southeastern Oklahoma State University, Durant, OK 74701, U.S.A.

ABSTRACT

Solidago ouachitensis C. & J. Taylor, a rare endemic of the Ouachita Mountains of Arkansas and Oklahoma is described new to science. The range of *Solidago speciosa* var. *pallida* is extended southward into New Mexico and Oklahoma.

INTRODUCTION

Continuing work on *Solidago* has resulted in the location of two additional taxa of *Solidago* for the south central United States (Taylor & Taylor 1983, 1984). One of these taxa is a new species from the Ouachita Mountains of Arkansas and Oklahoma. The other taxon, *Solidago speciosa* var. *pallida*, is sporadic along the front range of the Rocky Mountains and is being reported new to Oklahoma and New Mexico. Both taxa are examples of schizoendemics, their isolation probably occurring since the glaciers receded.

1. Solidago **ouachitensis** C. & J. Taylor, sp. nov.

Solidago caulibus simplicibus glabris, e caude ramoso; foliis lanceolatis glabris acutis, *usque ad 16 cm longis et 6 cm latis*, grosse serratis, in caulibus decurrentibus; inflorescentiis axillaribus; bracteis involucrorum glabris; *pedunculis pubescentibus vel glabratis*; floribus 4–8, *ligulatis 1 (0–2) per capitulum*, *achaeniis* 18 striis *glabris*.

Plants 7 – 12 dm tall, with few to several mostly unbranched glabrous stems from a branched rootstock. Leaves alternate, lanceolate to obovate, acute, *largest leaves at midstem up to 16 cm long, 6 cm wide*, with prominent midvein and numerous smaller lateral veins, glabrous, edges coarsely toothed, serrations up to 5 mm in size. Base of leaf decurrent on stem causing striations. Leaf internodes mostly 5 – 7 cm long. Inflorescence axillary, the upper 1/3 – 1/2 of stem leaves normally with 4 – 8 heads per axil, *pedicels glabrous to puberulent, involucral bracts 4.5 – 5 mm by 1 mm*, inner obtuse, outer acute, glabrous, margins ciliate, 1-nerved. Total flowers 4 – 8, *ray flowers 1 (0 – 2) per head*, ligule 3 mm x 0.5mm; disk corollas 4 mm long, (tube 2 mm, lobes 2 mm). *Mature achenes 4 mm long*, with about 18 striations, *glabrous*.

SIDA 11(3):334 – 339. 1986.

TABLE 1. Comparison of selected characters between *Solidago* taxa: *ouachitensis*, *caesia* var. *caesia*, *c.* var. *curtisii*, and *flaccidifolia*.

Character	OUACHITENSIS	CAESIA	CURTISII	FLACCIDIFOLIA
Longest leaf (cm)	12 – 16	10 – 12.5	11.5 – 17	10 – 15
Widest leaf (cm)	4 – 6	1.5 – 2.5	2 – 2.8	1.5 – 3.5
Internode lgth (cm)	5 – 7	1.5 – 2.5	1.3 – 3.5	2.5 – 3.5
Floral axis	glabrous	glabrous	pubescent	pubescent
Heads/leaf axil	4 – 8	4 – 10	5 – 15	4 – 10
Phyllary lgth (mm)	4.5 – 5	3.5 – 4.5	4 – 4.5	3.5 – 4
Phyllary width (mm)	1	0.7	0.7 – 1	0.7
Phyllary surface	glabrous	glabrous	± pubescent	pubescent
Flower number	4 – 8	8 – 9	6 – 12	5 – 9
Ray flower number	1(0 – 2)	3 – 4	3 – 4	3 – 4
Achene size (mm)	4	2.5	2 – 2.5	3
Achene surface	glabrous	pubescent	pubescent	pubescent

Endemic to very mesic forests on north-facing slopes in the Ouachita Mountains of Arkansas and Oklahoma. (Figs. 1, 2).

TYPE: U.S.A. OKLAHOMA. LeFlore Co.: mesic forest on north-facing slope of Rich Mountain, 5.3 mi N and 7 mi E of Big Cedar, 7 Oct 1984, *J. & C. Taylor 32788*. (HOLOTYPE: DUR; ISOTYPES: GH, MO, NLU, NY, OCLA, OKL, OKLA, SMU, UARK).

Solidago ouachitensis is a member of the *caesia-flexicaulis* complex of the eastern United States. It was first collected by G. W. Stevens in 1913 from near Page, Oklahoma. Until last year, it had been collected only four times from a total of three locations. The distribution shown for *S. curtisii* in Arkansas (Smith 1978) is based on material of this species as is apparently the report of *S. flaccidifolia* Small for Oklahoma (Uttal 1984). Uttal's report is based on *G. W. Stevens, s.n.*, Oklahoma, LeFlore Co., near Page in open woods on mountain side (US). Our specimen (DUR) with the same collecting data is *Stevens 2761* and is in early bud.

Table 1 gives a comparison of selected characters of sympatric *Solidago ouachitensis* and *S. caesia* var. *caesia* as they occur in the Ouachita Mountains of Arkansas and Oklahoma. Also included for comparison are two other closely related allopatric members of the *caesia-flexicaulis* complex. Measurments for *S. flaccidifolia* (*S. caesia* var. *paniculata* Gray) and *S. caesia* var. *curtisii* Wood (*S. curtisii* Gray) are based on the original descriptions and measurements from specimens collected by the authors in the Appalachian Mountains of North carolina and Tennessee.

Examination of data in Table 1 shows several morphological differences between *S. ouachitensis* and *S. caesia* var. *caesia*: leaf length/width ratio, leaf width, internode length, size of head, ray number, and achene size and surface. In the last seven years since our discovery of *S. ouachitensis*, no in-

Figure 1. Holotype of *Solidago ouachitensis* C. & J. Taylor.

termediates have been found by the authors despite yearly field trips in the area it is growing.

In the Appalachian Mountains, the closest related taxa are *S. caesia* var. *curtisii* and *S. flaccidifolia*. As the *caesia-flexicaulis* complex is variously treated by taxonomists (Cronquist 1980; Gleason 1968; Mackenzie 1933; Small 1903; Radford et al. 1968; Taylor & Taylor 1983; Uttall 1984a, 1984b, and pers. comm.) the measurements of Table 1 are based on the strict sense of the taxa. The disagreement as to number of species to be

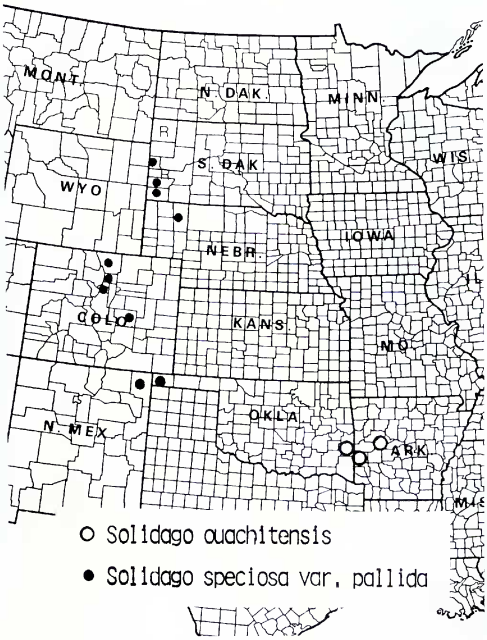

Figure 2. Distribution of *Solidago ouachitensis* and *Solidago speciosa* var. *pallida*. (R = additional locations reported by McGregor et al. 1977).

recognized is due to the large number of intermediates which do not clearly key to any single taxon. The characters which separate *S. ouachitensis* from these Appalachian taxa, are the glabrous achene, larger achene size, the single ray flower, greater internode length, and very wide leaf.

The vegetation of the Ouachita Mountains is closely allied with the Appalachian Mountains, and the dominants in the forest are similar or the same. During a cooler moister time, the goldenrod populations of these mountains occupied much larger ranges and were probably sympatric. *Solidago ouachitensis* is now a relict, and appears to be a holoschizoendemic as described by Keener (1983).

Solidago ouachitensis is restricted to very mesic, north-facing slopes, and its limited distribution makes it one of the rarest endemics of the Ouachita Mountains and a candidate for listing as endangered under the Endangered Species Act. Populations located in Mt. Nebo State Park in Arkansas are currently protected under Arkansas State Park regulations. The type location on the north slope of Rich Mountain is de facto wilderness, but the National Forest Service has not recommended this botanically rich area be included in the national wilderness system. The third site is in private ownership. A similar holoschizoendemic, *Solidago spithamaea*, is also known from only three locations in the Appalachian Mountains, and is currently being processed for designation as Endangered.

Other specimens examined (Fig. 2) are ARKANSAS: **Polk Co.**: north-facing slope adjacent to Big Fork Creek, 0.6 mi NW on Hwy 8 then 0.6 mi N of the town of Big Fork Creek, *J. & C. Taylor 32786* (DUR, SMU); and N facing slope and small spring on Big Fork Creek, about 18 mi S of Mena, elev. 1000 – 1100 ft., *McWilliams, s.n.*, 30 Oct 1954 (UARK), rocky dry area, top of mountain, P.O. Mena, elev. 2600, *Demaree 59493* (SMU). **Yell Co.**: bench overlook on Mt. Nebo, 8 mi E of Dardanelle, *J. & C. Taylor 32770* (DUR, SMU), and rocky woods, north side of Mt. Nebo, *Palmer 26487* (UARK). OKLAHOMA: **LeFlore Co.**: open woods on mountain side near Page, *Stevens 2761* (DUR, US?), and top north slope of Rich Mountain, *Taylor 25502* (DUR).

2. Solidago speciosa Nutt. var. pallida Porter. Bull. Torrey Bot. Club 19:130. 1892. *S. pallida* (Porter) Rydb. Bull. Torrey Bot. Club 33:153. 1906.

New to NEW MEXICO: Colfax Co.: Raton Pass, 17 Oct 1932, *A. & R. Nelson s.n.* (RM); and OKLAHOMA: Cimarron Co.: upper slickrock edge of Fern Canyon, 5 mi E of Kenton, *J. & C. Taylor 32592* (DUR, SMU). These populations at the southern end of the range of the variety (Fig. 2) appear to be relict, part of a spotty and limited distribution along the canyons and foothills of the front range of the Rocky Mountains from Oklahoma to South Dakota.

McGregor et al. (1977) shows this variety maintains a thread of contact with *Solidago speciosa* Nutt. proper along the Niobrara River in Nebraska.

However, the morphological affinities of var. *pallida* are not with the var. *rigidiuscula* Torr. & Gray, the common variety in the prairies, but with var. *jejunifolia* (Steele) Cronq. found in sandy areas adjacent to the Great Lakes. Cronquist (1947) indicated the closeness of var. *jejunifolia* with *pallida* and based his description and recognition of *jejunifolia* on its separate geographical distribution.

The affinity of our plants with those of more northern areas indicates again the relict nature of these populations, persisting and surviving a climate changing to warmer and drier conditions.

ACKNOWLEDGEMENTS

The following herbaria have assisted the authors by loan of specimens: COLO, CS, MO, RM, SMS, UARK. We extend our sincere gratitude to the curators of these institutions. Special thanks is given to Paul Fryxell for help with the Latin description.

REFERENCES

CRONQUIST, A. 1947. Notes on Compositae of northeastern United States IV. *Solidago*. Rhodora 49:69 – 79.

_____. 1980. Vascular flora of the southeastern United States. University of North Carolina Press, Chapel Hill.

GLEASON, H. A. 1968. The new Britton & Brown illustrated flora. Hafner Publishing Company, Inc., New York.

KEENER, C. S. 1983. Distribution and biohistory of the endemic flora of the mid-appalachian shale barrens. Bot. Rev. 49(1):65 – 115.

MACKENZIE, K. K. 1933. *Solidago* in Small, J. K., Manual of the southeastern flora. Published by the author, New York.

MARTIN, W. C. and C. R. HUTCHINS. 1981. A flora of New Mexico. Strauss and Cramer Publishers, Hirschberg, Germany.

MCGREGOR, R. L., T. M. BARKLEY, et al. 1977. Atlas of the flora of the Great Plains. Iowa State University Press, Ames.

RADFORD, A. E., H. E. AHLES and C. R. BELL. 1968. Manual of the vascular flora of the Carolinas. University of North Carolina Press, Chapel Hill.

SMALL, J. K. 1898. Studies in the botany of the southeastern United States. Bull. Torrey Bot. Club 26:465 – 484.

_____. 1903. Manual of the southeast flora. Published by the author, New York.

SMITH, E. B. 1978. An atlas and annotated list of the vascular plants of Arkansas. Student Union Bookstore, University of Arkansas, Fayetteville.

TAYLOR, C. E. S. and R. J. TAYLOR. 1983. New species, new combinations, and notes on the goldenrods (*Euthamia* and *Solidago* – Asteraceae). Sida 10:176 – 183.

_____. 1984. *Solidago* (Asteraceae) in Oklahoma and Texas. Sida 10:223 – 251.

UTTAL, L. J. 1984a. An overlooked *Solidago* in Virginia. Jeffersonia 15(4):72 – 74.

_____. 1984b. *Solidago flaccidifola* Small (Asteraceae) new to Oklahoma and other goldenrod notes. Sida 10:324 – 325.